mesostructured films are identified by at least one XRD peak in the range 2θ-2°-6° hexagonal, cubic, or lamellar electron diffraction patterns.

75. The method of claim 42 wherein the mesoporous film has a refractive index as low as approximately 1.13. → new matter

76. The method of claim 42 wherein the mesoporous film has sufficient porosity to result in a low dielectric constant of less than approximately 1.9. → new matter

77. The method of claim 42 wherein the mesoporous film has sufficient porosity to result in a low dielectric constant of as low as approximately 1.3. → new matter

Please cancel claims 36 and 68, without prejudice.

REMARKS

Claims 28-71 are pending reconsideration. Claims 1-27 are allowed. Claims 28-71 are rejected. Claims 28-31 remain rejected under 35 USC § 251 as being an improper recapture of claimed subject matter deliberately canceled in the application for the patent upon which the present reissue is based. Claims 32 and 58(a) are rejected under 35 U.S.C. § 112, ¶ 2, as being indefinite. Some, but not all, of claims 32-71 remain rejected under 35 U.S.C. § 251 and 35 U.S.C. § 112, ¶ 1, on the old ground that they represent new matter. Specifically, the Examiner concedes that the limitations of claims 35, 37, 39, 41-51, 60, 67, 69 and 71 find support in the patent, but contends that the limitations of claims 32-34, 36, 38, 40, 52-59, 61-66 and 70 lack support. The specification and claims 32-71 are rejected under 35 USC 112, ¶ 1, on the new ground that these claims are not "commensurate in scope with their enabling disclosure." Finally, the Examiner refuses entry of the amendment to claim 55 because of the form of the amendment.

Applicants hereby amend claim 53 in response to the Examiner's rejection thereof, as will be explained, applicants hereby amend 55 in accordance with the regulations, and applicant hereby amend claim 62 to more definitely and distinctly claim their invention. Applicants hereby traverse the remaining objections and rejections of the claims.

Applicants hereby add new claim 72, which is similar to amended claim 53 but draws its limitation to the optical dielectric constant described in the Bruinsma patent at column 10, lines 5-11. Applicants hereby add new claim 73, which is similar to claim 32 but omits the unneeded limitation regarding critical micelle concentration (CMC) and free surfactant claimed in the

Brinker patent. Applicants hereby add new claim 74, which is similar to new claim 73, but which expressly states the surfactant is present approximately *at or above* the CMC and is *not* present as free surfactant. New claims 73 and 74 thus correspond with, and dominate, claim 1 of the Brinker patent with which an interference is sought. Finally, applicants hereby add new claim 75, which is similar to amended claim 53, but which requires a refractive index as low as approximately 1.13 (supported by the Bruinsma patent, as will be described below.) Finally, applicants hereby add new claims 76 and 77, which claim methods for forming mesoporous films having sufficient porosity to result in low dielectric constants less than approximately 1.9 and 1.3, respectively. No new matter is added hereby, as pointed out below by way of the expert declarations that the Examiner suggested in the Office action might overcome the pending claim rejections.

Proper Presentation of Product Claims in Re-Issue Application

The Examiner continues his reliance on *Ball Corp. v. United States*, 221 USPQ 289 (Fed. Cir. 1984) and *In re Orita*, 193 USPQ 145 (CCPA 1977) and 35 U.S.C. 251 to reject claims 28-31, and also cites *In re Mead*, 581 F2d 251, 198 USPQ 412 (CCPA 1978) and the Manual of Patent Examining Procedure (which is not regulatory in nature and which does not represent recognized authority for the Examiner's position). The Examiner acknowledges on page 8 applicants' argument regarding case law that supports applicants' position regarding improper application of the rule against recapture, but does not discuss the cited case law that applicants submit is applicable in the present case. The Examiner's rejection is respectfully traversed.

Applicants first note that the cited rule against recapture has been discussed in telephonic conferences between their undersigned counsel and the Examiner, as well as with Special Programs Examiner (SPE) Doug McGinty. SPE McGinty relies on MPEP § 1450, ¶ 2 and cases cited therein for the broad USPTO position that no restricted, non-elected subject matter can be presented in a reissue application under 35 U.S.C. § 251. Agreement was reached only to disagree on what the applicable law is and whether the various claims 28-31 run afoul of it. Particularly, claim 31 was discussed, which claim resembles original claim 31 of the Bruinsma, et al. patent only in that it is drawn to a mesoporous film but is in the form of a product-by-process claim that applicants submit is within the same group as the pending process claims the subject of the broadening reissue application.

There are two lines of opinions relevant to whether the recapture rule bars applicants' claims 28-31. The line of cases cited by the Examiner, *Orita-Watkinson-Weiler-Meade* are the only known cases involving restricted, non-elected claims in a reissue application. That line of cases does not support the Examiner's position in the present case because in each of the cited cases applicant acquiesced to the restriction during prosecution of the parent application. Indeed, in each cited case, it is clear from a reading of the opinion that applicant did not even traverse the Examiner's restriction. The courts held that such acquiescence amounted to voluntary surrender of the subject matter of the canceled claims.

That is not the case here. Applicants traversed and spiritedly argued the Examiner's restriction during prosecution of the Bruinsma patent and canceled the original product claims only in response to a requirement by the Examiner to do so, for the purpose of obtaining allowance of the allowable process claims.

In stark contrast to the holdings of the *Orita-Watkinson-Weiler-Meade* line of cases, the Federal Circuit court in the more recent *Ball Corp.* and *Seattle Box* cases affirmed the validity of reissue patents thought by the defendant to have been improper recapture of abandoned subject matter. These cases are controlling in the present reissue application. The following remarks highlight the most pertinent parts of the case law cited by applicants. The *Ball Corp.* case supports applicants' position in the present case to the extent that its holding supported patentability of a reissue application and enforceability of the patent issuing therefrom. The *Ball Corp.* holding does not support the Examiner's position regarding application of the recapture rule because claims were canceled in *Ball Corp.* to overcome a prior art rejection. Claims to the subject matter of those canceled claims–but of lesser scope–were later allowed in the reissue application. *Ball Corp.* involved neither a restriction requirement in the parent application nor process and product-of-process claims.

The *Seattle Box* case also supports applicants' position in the present case. Decided eleven days after *Ball Corp.*, *Seattle Box* interprets the surrender aspect of the recapture rule. *Seattle Box* makes it clear that the recapture rule does not apply absent evidence that amendment of the originally filed claims was "in any sense an admission that the scope of that claim was not patentable." *See Seattle Box*, 221 USPQ at 574.

As pointed out before, the Federal Circuit court has expressly limited the *Ball Corp.* case to its particular facts–facts not present here. *In re Clement*, 45 USPQ2d 1161, 1166 (Fed. Cir.

1997). *Clement* sets forth a liberal modern view of reissue applications that involves more than a cursory comparison of the reissue claims and the canceled or amended parent claims. 45 USPQ2d at 1164. *Clement* requires that the claims be compared to determine whether and in what respects the reissue claims are broader. The next step is a determination of whether the broader aspects of those claims relate to subject matter surrendered in the parent prosecution.

It is instructive to remember the *Seattle Box* analysis of surrender. *See also* MPEP § 1412.02 ("reissue will not be granted to recapture claimed subject matter *deliberately canceled* in an application to obtain a patent." (Emphasis added)). Finally, after determining whether the subject matter was surrendered in the parent application, an inquiry is performed to determine whether the surrendered subject matter has crept into the reissue claims.

Accordingly, applicants submit that the Examiner should withdraw the rejections of claims 28-31 based upon both the mistaken application of the rule against recapture as well as the failure to properly examine claims 28-31 under the *Clement* analysis.

No Indefiniteness

The Examiner insists that the phrase "surfactant concentration is much less than the critical micelle concentration" found in claims 32 and 58 is indefinite. First, applicants note that the same language is present in claim 1 of the Brinker patent with which applicants seek an interference. Second, applicants note that new claim 73 does not include such a limitation, and thus claim 73 is free of this objected-to phrase and also dominates claim 1 of the Brinker patent since it is free of this unneeded limitation. Third, applicants submit that the phrase is well understood by those of ordinary skill in the art. See the Dr. Liu Declaration, attached hereto as Exhibit 1, at paragraph 9, where it is stated that one of skill would have understood the "much less than the critical micelle concentration" would have been understood to refer to a micelle concentration having sufficient margin so as not to exceed the critical micelle concentration as that term is well understood. The Examiner has suggested that applicants amend the gist of the phrase to "surfactant concentration that exceeds a critical micelle concentration... ." Accordingly, applicants hereby adopt the Examiner's suggestion and amend claims 31 and 58 in the manner suggested.

Applicants note that no new matter is added, since the characteristic would have been well understood to be an inherent characteristic of the Bruinsma patent-disclosed CTAC/TEOS

molar ratios. (See Dr. Liu Declaration, Paragraph 9.) Applicants submit that thus-amended claims 32 and 58 correspond with claim 1 of the Brinker patent, since the phrase terminology uses different words to describe the same limitation.

No New Matter

The test is whether the disclosure makes the invention clear to a mechanic skilled in the art so that he could make and use it. *Schriber-Schroth Co. v. Cleveland Trust Co.*, 311 U.S. 211, 47 USPQ 345 (1940).

Moreover, "U.S.C. §112 does not require a specific teaching of that which is already known to one of ordinary skill." *Case v. CPC International, Inc.*, 221 USPQ 196, 201 (Fed. Cir. 1984).

Applicants can disclose the invention in the application (a) by drawings, (b) by the use of language, or (c) by citing and teaching such subject matter as will inherently do the thing or possess the quality which is claimed for it. *Hansgirg v. Kemmer*, 40 USPQ 665 (CCPA 1939); *Binstead v. Littmann*, 113 USPQ 279 (CCPA 1957); *McAninch v. O'Brien*, 170 USPQ 224 (CCPA 1971).

Finally, "[a] specification disclosure which contains a teaching of the manner and process of making and using the invention in terms which correspond in scope to those used in describing and defining the subject matter sought to be patented *must* be taken as in compliance with the enabling requirement of the first paragraph of § 112." *In re Marzocchi,* 169 USPQ 367, 369 (CCPA 1971) (emphasis in original).

With respect to claims 32 and 64, the Examiner wonders at page 4 where is the support for the claimed critical micelle concentration (CMC) and X-ray Diffraction (XRD) peak limitations. Support for the critical micelle limitation is believed to have been inherent in the Bruinsma patent disclosure, to those of ordinary skill in the art when the application was filed, namely August 26, 1997. This knowledge of one of ordinary skill in the art, and the inherent "much less than a critical micelle concentration" characteristic of the disclosed chemistries is proved by expert testimony in the form of the Dr. Liu Declaration attached hereto as Exhibit 1. Dr. Liu (co-inventor of the present reissue application), a Materials Science PhD and Senior Staff Scientist at Battelle Memorial Institute in Richland, Washington, is a widely published expert in the field of surfactant chemistry and mesoporous materials. (Dr. Liu Declaration, paragraphs 1,

4 and 7.) He concludes that CMC as it appears in the familiar Brinker patent "refers to a threshold surfactant concentration beyond which the addition of new surfactant to the solution favors the formation of micelles...instead of free surfactant molecules." (Dr. Liu Declaration, paragraph 8.) He further states that one of ordinary skill in the art would have known this at the time the Bruinsma application was filed, i.e. August 26, 1997. (Dr. Liu Declaration, paragraph 8).

Dr. Liu carefully replicated Experiment 1 disclosed in the Bruinsma patent and concluded that, from this known CMC definition, at least three of the CTAC/TEOS MOLE RATIOs illustrated in Fig. 2 represent micelle concentrations "much less than" that the CMC of 0.21 mol/liter (corresponding to a CTAC/TEOS molar ratio of 0.16). (Dr. Liu Declaration, paragraph 9.) Finally, it is Dr. Liu's expert opinion that a micelle concentration of "much less" than a CMC would have been concluded by a person of ordinary skill on August 26, 1977 "to be an inherent characteristic of at least some of the precursor solutions described and illustrated in the Bruinsma patent." (Dr. Liu Declaration, paragraph 10.) Accordingly, applicants submit that this Brinker limitation copied into applicants' claim 32 (as amended hereby to adopt the language suggested by the Examiner and consistent with the meaning attributed to the objected-to phrase by expert Dr. Liu) is amply supported by the Bruinsma patent and is not new matter thereto, when the Bruinsma patent is read by one of ordinary skill in the art.

Support for the XRD peak claim limitations may be found in Figs. 5, 7, 8, 9, 10, 16, 18, 19, 20 and 21, every one of which shows such peaks characteristic of applicants mesoporous films and processes in the claimed 2-6°2θ range. These graphs are consistently described in the Brief Description of the Drawings and in the Description of the Preferred Embodiment(s) sections of the patents as showing film XRD and powder XRD (PXRD) patterns and peaks, and makes abundantly clear what anyone of ordinary skill would have known, namely that the horizontal axis is in degrees (°). (See, for example, column 13, lines 35-36.)

The Examiner goes on to say on page 4 that "some of the initial starting components of soluble source of metal oxide (what is this), water, organic solvent, surfactant, acid and base catalyst, etc. is not" convincingly explained as being within the original Bruinsma disclosure. The Examiner also states that there is no support for the surfactant being a "free" surfactant. Applicants respectfully traverse the rejection on new matter grounds, and, by way of further

explanation, submit expert testimony concerning what those of ordinary skill in the art on August 26, 1977 would have known from a fair reading of the Bruinsma patent.

Dr. Berg is a Chemical Engineering PhD and Professor at the University of Washington in Seattle, and is a widely published expert in the field of interfacial and colloid science, including surfactant solutions and self-assembled structures formed therein. (Dr. Berg Declaration, paragraphs 1, 4 and 7, attached hereto as Exhibit 2.)

Dr. Berg points out that silica or SiO_2 has been classified under "metal oxides" in the technical literature for over ten years, citing a Brinker textbook and the familiar Brinker patent application which was filed only slightly more than a month after the Bruinsma patent application filing date. (Dr. Berg Declaration, paragraph 8.) Accordingly, applicants submit that on August 26, 1997 silica would have been broadly understood by those of ordinary skill in the art to be a metal oxide, as the Brinker patent uses that term. Dr. Berg also states that "[i]t would be reasonable for one of ordinary skill in the art to assume that the silica precursors described in the Bruinsma patent could be substituted by similar metal oxides", since such had been demonstrated prior to 1996 in the synthesis of mesoporous materials. (Dr. Berg Declaration, paragraph 12.) Accordingly, applicants submit that silica on August 26, 1997 would have been broadly understood by those of ordinary skill to be readily substituted by other metal oxides to form suitable precursors in mesoporous film formation.

9 yeah, I don't think so my friend

Dr. Berg goes on to say that aqueous solvents as described in the Bruinsma patent would have been understood to be simply water mixed with one or more other solvents such as alcohol, and concludes that Brinker's organic solvents are simply an organic solvent containing one or more other solvents including water, the very same thing as Bruinsma's aqueous solvents. (Dr. Berg Declaration, paragraph 11.) Accordingly, applicants submit that aqueous solvents on August 26, 1997 would have been understood by those of ordinary skill in the art to be nothing more than the organic solvents described and claimed in the Bruinsma patent.

disagree so back to col. 6 only acid catalyst is taught No base

The Bruinsma patent refers at column 7, lines 40-52, to cationic surfactants as "preferred", but by no means exclusive. Dr. Berg's expert testimony is supportive of the conclusion that such a teaching is not limited to cationic surfactants. Dr. Berg states that one of ordinary skill in the art would have known on August 26, 1977 that "other surfactants, e,g, anionic or non-ionic or amphoteric, can be usefully employed in substitution therefor in the described process for forming mesoporous films...because other surfactants, including non-ionic

surfactants, had already been used to make mesoporous powders... ." (Dr. Berg Declaration, paragraph 9.)

Dr. Berg goes on to say that the surfactants described in the Bruinsma patent "would be understood to be 'free' surfactants in the sense of Brinker's use of that term...as opposed to micellar surfactants", citing the Dr. Liu Declaration for the conclusion that the very same freedom characterizes the surfactants used in the Bruinsma patent to form mesoporous films. (Id.) Accordingly, applicants submit that their teachings broadly support surfactants other than cationic surfactants, and that their surfactants, in certain disclosed CTAC/TEOS molar ratios, are "free" in the same sense that Brinker uses that term.

Dr. Berg says that catalysts typically are either base or acid, and concludes that those of ordinary skill in the art on August 26, 1997 "would have been well aware of the possible substitution of a base catalyst...for the described acid catalyst of the Bruinsma patent...", citing prior published reports of the use of base catalysts for synthesizing mesoporous powders using surfactants and inorganic precursors. (Dr. Berg Declaration, paragraph 10.) Accordingly, applicants submit that their teachings support the use of catalysts other than acid, including also at least base catalysts.

come on!

The Examiner states that claims 33 and 65 are new matter, because there is no support in the disclosure for optical coatings. The Examiner thinks that, because a refractive index measurement could be used for purposes other than optical coatings, it does not support applicants' use of the disclosed films having the measured refractive indices as optical coatings. Applicants traverse the rejection for the following reasons.

The Examiner concedes that one purpose of measuring refractive index would be to use applicants' mesoporous films as optical coatings. But then the Examiner concludes that if there is another purpose for applicants' refractive index measurements, then no support for use of the mesoporous films as optical coatings exists. Applicants submit that one of ordinary skill in the art reading the Bruinsma patent application on August 26, 1997 would have known of the applicability of the mesoporous films to use as optical coatings, based upon the disclosure of refractive index and reference to the film as "a coating...on other structures." (Column 10, lines 3-14; column 2, line 17.) This is because optical "coatings" having measurable refractive indices, transparency, clarity and other optical qualities important to any optical application at the time of the filing of the Bruinsma patent application were a popular use to which mesoporous

powders or films had been put. See, for example, J. Liu, J. Bontha, A. Kim and S. Baskaran, *Preparation of Continuous Mesoporous Films on Porous and Dense Substrates*, MRS Proceedings, pp. 245-250 at p. 246-247 (presented April 1996; published November 1996), attached hereto as Exhibit 3.

The Examiner states at page 4 that claims 34 and 66 represent new matter. The Examiner incorrectly states that "applicants indicate that they have support for adding aluminum (metal) in silica (silicon dioxide) films in their Example 5 and support for silica films." Applicants do not add aluminum, and certainly do not add aluminum metal (as suggested by the Examiner at the top of page 5); applicants incorporate aluminum nitrate $Al(NO_3)_39H_2O$ in their film in Example 5. The Bruinsma patent suggests that metal oxides ("aluminum-oxide crystalline phase") in the Si-Al-O-H system of Example 5 were expected, but that the XRD showed only crystobolite (SiO_2) and further suggests that that the two were not visually separable in reading the XRD results. (See column 14, lines 3-6.) Applicants note that the copied Brinker claim represented in claims 34 and 66 does not require "adding" metal oxides to anything. Instead they require only "preparing a precursor sol containing a soluble source of a metal oxide" and other components (base claims 32, 64), "wherein said metal oxide is an oxide of silicon, aluminum, or combinations thereof" (claims 34, 66).

Accordingly, applicants submit that their reference in Example 5 to the XRD-masked but present aluminum-oxide by-product of calcination meets the claims limitations and that the rejection should be withdrawn. Moreover, applicants point out to the Examiner that Dr. Berg, an expert on surfactant solutions and self-assembled structures formed therein, believes that the Bruinsma patent silica precursors would have been reasonably understood by the ordinarily skilled to be readily substituted by similar metal oxides, of which applicants submit aluminum oxide clearly is one.

Evidently, the examiner was correct

The Examiner states that there is no support in the Bruinsma patent for the broad 0-4 hour aging range recited in claims 36 and 68. Without conceding the Examiner's position, applicants hereby cancel the two claims, thereby rendering these rejections moot.

The Examiner states on page 5 with respect to claims 38 and 70 that applicants have support for approximately 450°C, but not for "approximately 400°C". Applicants respectfully traverse the rejection for the following reasons.

According to Dr. Berg, prior art calcination of surfactant-templated materials was over a wide temperature range of 400°C-650°C or more, making the semiconductor processing temperatures of 400°C-450°C a lower and a relatively narrower temperature band, and one of ordinary skill on August 26, 1997 would have concluded from the singular semiconductor example of the Bruinsma patent that approximately 400°C suggested a range of 400°C-450°C. (See Dr. Berg Declaration, paragraph 14.) Accordingly, applicants submit that "approximately 400°C" in the Brinker patent claims would have been understood to include, in the semiconductor field, temperatures up to and including approximately 450°C. Applicants submit that the rejection should be withdrawn for the following reasons.

The Examiner states at page 5 that claim 40 must be new matter because "applicants now delete a critical step to their method." The Examiner apparently is of the opinion that applicants are limited to the actual spin-coating step that was used in disclosed Examples 1 and 10. The Examiner concludes that "there is no support for a step of not actually using a step of spin coating and only rapid evaporation." Applicants most strongly traverse this rejection for the following reasons.

OK w/drw this applts appear correct here

The Examiner is referred to the Bruinsma patent at column 3, lines 47-50; column 4, lines 16-50 regarding applicants' broad "rapid drying or evaporation" techniques that are suitable in their mesoporous film-forming process, including spin coating. Through these columns, the patent says that rapid drying or evaporation may be accomplished by "forming a preform by any of layer thinning, for example spin casting; drawing; or spraying... ."

The Bruinsma patent goes on to explain that layer thinning leaves "a geometrically thinner layer of the silica precursor solution from which the solvent quickly escapes via evaporation" Next, the Bruinsma patent says that such layer thinning to accomplish rapid drying or evaporation "may be by any method including but not limited to squeegeeing and/or spin casting. Spin-cast mesoporous films are formed on the order of a minute or even seconds."

The Bruinsma patent then explains the advantages of layer thinning as a form of rapid drying or evaporation, these advantages including quick film formation, no need for special atmospheres, pressures or special drying equipment and ordered film porosity having a controlled pore size.

Finally, the Bruinsma patent discusses the further advantages of the preferred method of rapid drying or evaporation as involving spin coating, the advantages including uniform film thickness, repeatable and controllable film thickness, small solution batches and less waste.

Nowhere does the Bruinsma patent suggest that spin coating is "critical" to achieve rapid drying or evaporation. To the contrary, broad teachings of how to achieve rapid drying or evaporation are discussed at length, explaining why one might be preferred over another and why, ultimately, spin coating might be preferred over all.

Applicants are required under the patent statute to disclose the preferred embodiment of their invention and to describe the best mode of operation thereof, but applicants' claims are not limited to such preferred embodiments or best modes unless such limitations are needed to distinguish the invention over the prior art. This is especially so when the specification teaches more broadly (as is usual), or when one of ordinary skill in the art would have known how to make reasonable substitutions for the preferred steps or starting components.

Applicants know of no case where the Examiner's requirement--that every feature of the preferred embodiment or method to be a limitation to a claim for the claim to avoid a new matter rejection--has been sustained on appeal. The Examiner cites no authority for rejecting claim 40 on the ground that it is not limited to one of many disclosed ways of performing the recited rapid evaporation step. Applicants therefore submit that this rejection should be withdrawn.

The Examiner states at page 6 that the numeric values of the refractive index limitations of claims 52 and 53 are unsupported by the Bruinsma patent. First, applicants hereby amend claim 53 to recite a refractive index "as low as approximately 1.16" (which is the lowest measured refractive index disclosed in Fig. 4--see Brief Description of Drawings at column 6, lines 1-3). Second, applicants point out that Fig. 4 supports numerous claims to refractive indices, including at the very least the particular measured values indicated by measures data points (squares) on the graph. Clearly, a refractive index of approximately 1.16 and a refractive index of approximately 1.25 are claimable, as they correspond approximately with the fourth and last square from left to right in Fig. 4.

Third, and most importantly, applicants submit that they are entitled to claim any refractive index corresponding to a smooth curve drawn through the points on the graph of Fig. 4, as such represents textbook data interpolation and extrapolation well-known to anyone of ordinary skill in the art. Accordingly, applicants submit that a refractive index of

approximately 1.13 is claimable, as such is on a smooth curve drawn through the particular measured data points, which data points clearly establish a curve trend. Such a refractive index would have been realized, based upon the Bruinsma patent disclosure, by simply further increasing the CTAC/TEOS mole ratio above the highest illustrated CTAC/TEOS molar ratio of approximately 0.245. (See Fig. 4.)

Undersigned counsel for applicants has drawn such a simplex smooth curve fairly through the data points of Fig. 4 of the Bruinsma patent in the attached Exhibit 4. As was known by those of ordinary skill in the art on August 26, 1997, such a smooth curve to the right of the graph would have a lower limit, or asymptote, at 1.0, which is the refractive index of air (corresponding with 100% mesoporous film porosity). The curve illustrates support in the Bruinsma patent for refractive indices below the lowest measured 1.16 refractive index n, and particularly for a refractive index of as low as approximately 1.13, as is claimed in claim 75 added hereby.

With respect to previously pending and rejected claims 54, 55 and 63, and with respect to added claims 76 and 77 applicants submit that there was at the time of the filing of the Bruinsma patent application on August 26, 1997 a very well-understood relationship between refractive index, porosity and dielectric constant in silica mesoporous films. Accordingly, applicants submits that the dielectric constants that are recited in the pending claims are well-supported by the original Bruinsma patent when read by one of ordinary skill in the art.

This well-known relationship between refractive index, porosity and dielectric constant in a silica mesoporous film is described in expert declarations submitted herewith by Drs. Gnade, Plawsky and Ferris in attached Exhibits 5, 6 and 7,respectively. As will be shown, all three experts agree this straightforward, well-understood relationship would have enabled those of ordinary skill in the art on August 26, 1997 straightforwardly to interpret the refractive indices Fig. 4 obtained by measurement in the Bruinsma as indicative of corresponding film dielectric constant.

All three of these widely published experts in the field of dielectrics modeling including such relationship among dielectric constant, porosity and optical properties of oxide materials conclude that the resulting mesoporous film dielectric constant obtainable from the studied Bruinsma patent's refractive index teachings range from a high of 3.5 to a low of approximately 1.3. (See Drs. Gnade, Plawsky and Ferris Declarations, paragraphs 4, 5, 6 and 10.) Drs. Gnade,

Plawsky and Ferris draw their conclusions from a series of graphic plots that describe these relationships by various curves representing the upper and lower bound on dielectric constant based upon different models (including the perpendicular to surface, parallel to surface, logarithmic and Bruggeman models). Figure 1 describes the relationship between the optical dielectric (described in the Bruinsma patent in ideal terms simply as the square of the refractive index), and porosity (in terms of mesoporous film void volume as a fraction of total film volume). (See Drs. Gnade, Plawsky and Ferris, paragraph 8.) Figure 2 describes the relationship between refractive index and porosity, and the experts conclude that one of ordinary skill would have understood the Bruinsma-disclosed refractive indices to correspond with pore volume fractions from approximately 0.2 to 0.7. (See Drs. Gnade, Plawsky and Ferris, paragraph 9.) Figure 3 describes the relationship between porosity and film dielectric constant, and the experts conclude that one of ordinary skill would have understood the derived pore volume fractions from approximately 0.2 to 0.7 to correspond with a film dielectric constant from approximately 3.5 to 1.3. (See Drs. Gnade, Plawsky and Ferris, paragraph 10.) The experts so conclude based upon the knowledge of one of ordinary skill that the dielectric constant of dense silica is well known to be approximately 4.1 (the upper limit shown for silica film dielectric constant in the upper left corner of the graph). (Id.)

Dr. Plawsky says in connection with his Figure 4 that it would be expected for the materials described in the Bruinsma patent to have dielectric constants below those calculated from another known correlation described in the literature (by Hrubesh, et al., Henning and Svensson), i.e. below the 2.13 to 3.84 range corresponding to refractive indices of 1.16 to 1.4. (See Dr. Plawsky Declaration, paragraph 10.) Dr. Plawsky's experience with xerogels having considerable organic character illustrates in Fig. 4 measured xerogel film dielectric constants below the calculated range. Indeed, Figure 4 shows that xerogel film porosity as high as 70% would correlate with a xerogel film dielectric constant of between approximately 1.8 and 1.9. Finally, Dr. Plawsky states that it is his opinion that Bruinsma's silica films would behave similarly to Dr. Plawsky's own xerogel films. (See Dr. Plawsky Declaration, paragraph 10.) Accordingly, while the derivation of film dielectric constant from refractive index is straightforward, it is somewhat inexact, i.e. it is an approximation. This is evidenced by Dr. Plawsky's slightly different conclusions regarding the correlation between the theoretical and the real world. Thus, while agreeing generally with Drs. Gnade and Ferris, Dr. Plawsky concludes

that the Bruinsma patent teaches film dielectric constants at least as low as approximately 1.9 and probably as low as approximately 1.3. All the experts agree also that one of ordinary skill in the art on August 26, 1997 would have straightforwardly concluded the same, based upon their ready knowledge of these relationships and the teachings of the Bruinsma patent in the field of mesoporous films and dielectric modeling principles. Accordingly, applicants submit that the Examiner should withdraw his rejection of claims 54 and 63 pertaining to methods of forming mesoporous films having dielectric constants of "less than approximately 3.0" (claim 54) and less than approximately 2.5" (claims 55 and 63).

Moreover, applicants submit that new claim 76 pertaining to methods of forming mesoporous films having dielectric constants "less than approximately 1.9" is allowable as well. This is because such a claimed dielectric constant is within the range of dielectric constants determined by all three experts in paragraph 10 by use of the well-known calculus and is also consistent with Dr. Plawsky's xerogel film measurements as plotted in Figure 4 of his declaration. Finally, applicants submit that new claim 77 pertaining to methods of forming mesoporous films having dielectric constants "as low as approximately 1.3" is allowable. This is because all three dielectric modeling experts agree the well-known correlations and a fair reading of the Bruinsma patent would have been known to support such a low derived dielectric constant from the measured and disclosed low refractive indices of Fig. 4 of the Bruinsma patent.

The Examiner's rejection of claims 56-59 and 61 (page 7) as new matter are squarely overcome above by reference to the Drs. Liu and Berg Declarations regarding what those of ordinary skill in the art on August 26, 1997 would have known. That knowledge includes knowledge about inherent micelle concentration and free surfactant characteristics of the Bruinsma teachings and the ready surfactant, catalyst and solvent substitutions in related fields such as mesoporous powders. Applicants submit that these rejections should be withdrawn for all of the reasons given above.

Finally, the Examiner states that the limitations of claim 62 are new matter because there is no support for the recited "superstoichiometric amount" of aqueous solvent. First, applicants hereby amend claim 62 to more definitely recite their invention as involving a water-to-soluble-source-of-metal-oxide ratio in a superstoichiometric amount. As pointed out above by reference to Dr. Berg's expert declaration, silica has been classified as a metal oxide. Dr. Berg states that the solutions described in the Bruinsma patent uses water-to-silica molar ratios of 7-to-1, which

is higher than the known water-to-silicon molar ratio of 2 that is sufficient for complete reaction. (Dr. Berg Declaration, paragraph 13.) Thus, the original Bruinsma disclosure supports the recited superstoichiometric amount in amended claim 62. Applicants request withdrawal of the rejection.

Enabling Disclosure Commensurate with Scope of Claims

Applicants submit that the above no-new-matter discussion regarding the knowledge of one of ordinary skill of the availability and desirability of known substitutes for silica, silica precursors, cationic surfactants, aqueous solvents and acid catalysts overcome the Examiner's 35 U.S.C. § 112, ¶ 1 rejection based upon commensurate in scope as well as that based upon new matter.

Dr. Berg says at paragraphs 8 and 12 of his declaration that silica is a metal oxide, the way that term is used by Brinker, and that other metal oxides would have been known to be reasonably be substituted therefor.

Dr. Berg says in paragraph 12 of his declaration that silica precursors would have been reasonably substituted by "similar metal oxides", since such had been much earlier demonstrated in the mesoporous materials field.

Dr. Berg at paragraph 9 of his declaration says that other surfactants including those that are anionic, non-ionic or amphoteric, would have been "usefully employed in substitution" for the cationic surfactants that the Bruinsma patent discloses as being only "preferred", again because others had already been used to make mesoporous powders.

Dr. Berg says at paragraph 11 of his declaration that aqueous solvent would have been understood to be, very simply, water mixed with one or more other solvents such as alcohol, and Dr. Berg concludes that Brinker's use of water-alcohol mixtures is "nothing other than [the] aqueous solvents" described and claimed by Bruinsma.

Finally, Dr. Berg says at paragraph 10 of his declaration that it was well known by those of ordinary skill in the art when the Bruinsma patent application was filed that catalysts are typically either base or acid and that the base catalyst described in the alternative in the Brinker patent would have readily been substituted for Bruinsma's acid catalyst, since others had already reported the use of base catalysts "for synthesizing mesoporous powders using surfactants and inorganic precursors."

The measure of the enabling disclosure is more than merely those embodiments expressly disclosed in the specification. "The scope of the enablement, in turn, is that which is disclosed in the specification plus the scope of what would be known to one of ordinary skill in the art without undue experimentation." *National Recovery*, 49 U.S.P.Q.2d at 1675-76. Yet, the Examiner of the present application takes the position that the extent of the enabling disclosure of the current application extends only to those embodiments specifically recited therein. (See Office Action, p. 3. "Applicants only have support for the enabling features *specifically recited* in their original disclosure." (Emphasis added.)).

The Examiner has improperly identified the scope of the enablement provided by applicants. The Examiner has done so by underappreciating the scope of what would have been known to one skilled in the art without undue experimentation. In cases where the claimed scope exceeds the expressly disclosed scope, knowledge gained from the state of the art is inherent when "one skilled in the art would recognize such a disclosure" from the specification. *Tronzo v. Biomet*, 47 U.S.P.Q.2d 1829, 1834 (Fed. Cir. 1998).

In conclusion, one ordinarily skilled in the art would necessarily conclude that it would have been reasonable, useful and desirable to use known alternatives to "silica, aqueous solvents, cationic surfactants, acid catalysts, specific heating temperatures, other ranges, etc." All such alternatives were within the knowledge of those of ordinary skill in the art on August 26, 19777, and none was taught away from by Bruinsma, et al. in the original application. In other words, none of the omitted limitations of the original claims was necessary, let alone "critical" (as the Examiner alleges regarding applicants' spin coating limitation) to their claimed invention. It is those unnecessary limitations, the incorporation of which was acknowledged mistake, that gave rise to the present broadened reissue of the Bruinsma patent application.

Accordingly, applicants submit that all of their pending claims are properly scoped as having been within the scope of the original patent disclosure, are definite and require no such narrowing limitations to distinguish them from a patentability standpoint over the prior art.

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For all of the foregoing reasons, applicant solicits reconsideration and allowance of all pending claims including rejected claims 28-71 of the application, as amended, and new claims 72 through 77 added hereby. The Examiner is encouraged to telephone the undersigned at (503) 222-3613 upon receipt hereof. Applicants and their undersigned counsel respectfully solicit a personal interview with the Examiner at the earliest possible time to resolve any outstanding concerns and to obtain at least conditional allowance of all pending claims of the present reissue application and the declaration of an interference with the Brinker patent.

Respectfully submitted,

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I hereby certify that this correspondence is being deposited on **November 13, 2000** with the United States Postal Service as First Class mail in an envelope addressed to Box FEE AMENDMENT, Assistant Commissioner of Patents, Washington, DC 20231.

Heather Kulin